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Test 501: New Fordson Major

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The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: August 17 to August 26, 1953
Manufacturer: FORD MOTOR CO. LTD., DAGEN-
HAM, ESSEX, ENGLAND
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 501

NEW FORDSON MAJOR

BELT HORSEPOWER TESTS.

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air	
* TESTS B & C—100% MAXIMUM LOAD—TWO HOURS								
33.56	1600	3.338	10.05	0.609	0.00	187	65	29.130
TEST D—RATED LOAD—ONE HOUR								
29.46	1600	3.124	9.43	0.649	0.00	176	62	29.140
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
29.46	1600	3.113	9.46	0.647	...	174	62	.....
2.19	1719	1.593	1.37	4.452	...	148	61	.....
15.60	1691	2.397	6.51	0.940	...	160	60	.....
32.43	1500	3.205	10.12	0.605	...	186	62	.....
7.91	1711	1.941	4.08	1.502	...	156	62	.....
22.74	1647	2.770	8.21	0.745	...	175	63	.....
18.39	1645	2.503	7.35	0.833	0.00	167	62	29.145

TORQUE (At Dynamometer)

Eng. RPM	1602	1500	1413	1348	1242	1155	1054	955	863	785
Lb. Ft.	180.1	188.3	196.7	203.9	209.1	212.5	211.8	209.7	209.7	208.8

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cool- ing med	Air	
TESTS F & G—100% MAXIMUM LOAD											
23.59	5016	1.76	1596	16.70	.....	Not Recorded	.....	195	82	28.870
29.35	4194	2.62	1600	12.18	.....	Not Recorded	.....	181	68	29.070
29.88	3178	3.53	1600	7.64	.....	Not Recorded	.....	188	82	29.080
30.68	2256	5.10	1600	5.13	.....	Not Recorded	.....	180	82	29.050
30.72	1602	7.19	1597	3.75	.....	Not Recorded	.....	178	84	29.050
23.76	675	13.20	1599	1.92	.....	Not Recorded	.....	182	86	29.050
TEST H—RATED LOAD—TEN HOURS 3rd Gear											
23.91	2509	3.57	1603	6.59	2.919	8.19	0.747	0.00	181	86	29.037
TEST J—OPERATING MAXIMUM LOAD 3 Gear											
26.78	3020	3.33	1602	14.31	.....	Not Recorded	.....	190	90	28.830
TEST K—OPERATING MAXIMUM LOAD 3rd Gear											
27.36	2981	3.44	1600	12.61	.....	Not Recorded	.....	185	94	28.820

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	1058 lb each	None	None
Rear tires			
No. and size	Two 14-30	Two 14-30	Two 11-38
Ply	6	6	6
Air pressure	12 lb	12 lb	12 lb
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 7.50-16	Two 7.50-16	Two 7.50 16
Ply	6	6	6
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	23 inches	24½ inches	25 inches
Static weight			
Rear end	5387 lb	3270 lb	3273 lb
Front end	1710 lb	1720 lb	1714 lb
Total weight as tested with operator	7272 lb	5165 lb	5162 lb

FUEL, OIL and TIME Gasoline Octane No ASTM 76 Research 82 (rating taken from oil company's typical inspection data); weight per gallon 6.120 lb OIL SAE 30; to motor 1.682 gal; drained from motor 1.529 gal Total time motor was operated 43 hours.

CHASSIS TYPE Standard Serial No. 1260403 Tread width rear 52" to 72" front 53½" to 77½" Wheel Base 80" Hydraulic control system driven by P.T.O. shaft Advertised speeds mph first 2.07 second 2.92 third 3.73 fourth 5.25 fifth 7.32 sixth 13.16 reverse 2.80 and 5.03 Belt pulley diam 8½" face 6¾" rpm 1600 and 889 Belt speed 3560 and 1982 fpm Clutch Single plate dry disc clutch operated by foot pedal Seat pressed steel seat with rubber puck suspension Brakes Internal expanding shoe operated by two foot pedals Equalized by locking two brakes together Power take-off Standard type.

ENGINE Make Ford Motor Co. Ltd. (England) Type 4 cylinder vertical Serial No. 1260403 Crankshaft mounted lengthwise Head I Lubrication pressure Bore and Stroke 3.740" x 4.524" Rated rpm 1600 Compression ratio 5.5 to 1 Displacement 199 cu. in. Port Diameter Valves Inlet 1.56" Exhaust 1.375" Governor Variable speed centrifugal Carburetor Size 29/32" Ignition System battery Starting System 12 volt Ail Cleaner Oil washed wire screen Muffler was used Oil Filter removable filter element Cooling medium temperature control Thermostat and shutters.

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J, and K were made with the same setting of the carburetor (selected by the manufacturer).

HORSEPOWER SUMMARY

	Draw- bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	31.39	34.63
2. Observed maximum horsepower (tests F & B)	29.88	33.56
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	23.54	29.44

We, the undersigned, certify that this is a true and correct report of official tractor test No. 501.

L. F. LARSEN
Engineer-in-Charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors, which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season.

The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

